Tournament Incentives and Financial Regulation*

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Abstract

I study how tournament incentives affect financial market regulation, by using original employee-level data on enforcement attorneys at the U.S. Securities and Exchange Commission (SEC). Tournament incentives, reflected by better promotion opportunities and larger expected salary within the SEC, seem to increase enforcement activity. I show that the positive relation holds at the aggregate level and at the individual attorney's level. I evaluate and provide evidence to reasonably rule out alternative explanations such as outside job opportunities, cash bonus, hierarchy, and case assignment. The results indicate that the SEC's internal organization could affect financial markets, and highlight a novel link between incentives and regulation.

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1 Introduction

Studies of regulation typically analyze the written rules, implicitly assuming that these will be carried out by a "faceless bureaucracy". But can regulatory output be affected by the regulator's internal organization? Specifically, can the *compensation structure* of a government agency stimulate effort among its employees? In this paper I explore this novel question by using an original employee-level data set on the U.S Securities and Exchange Commission (SEC). I show that tournament incentives among SEC enforcement attorneys seem to affect the level of enforcement activity. It appears that larger pay gaps and better promotion opportunities generate tournament incentives, which lead to increased enforcement activity.

The SEC brings enforcement actions to protect "main street" investors from violations of federal securities laws. The efforts, and hence the incentives, of frontline SEC employees are essential to the enforcement process. In many cases, "it is the lawyers, accountants, and other professionals from the SEC's enforcement and exam programs who initially detect the misconduct and put the preliminary case together."[1] The SEC's enforcement activity is therefore a useful setting to study how compensation incentives affect the provision of public services by government employees.

A key contribution of this paper is the focus on attorney-level incentives and output. Measuring incentives and matching them to an employee-level output metric is a major empirical challenge (Bertrand et al. (2016); Mueller et al. (2017b)). To overcome this I construct a novel, hand-collected dataset, from Freedom of Information Act responses and legal documents. The panel stretches from 2002 till 2017, and includes all attorneys at the Enforcement Division and the regional offices. It links attorney-level participation in civil enforcement actions to employment-related information such as salary and tenure. It allows me to study incentives and enforcement at a highly granular level.[2]

I start by documenting the positive correlation between incentives and enforcement

[1] Mary Jo White, then SEC Chair (3.31.2014).

[2] I focus on employee-level output, and references to *productivity* and *performance* should be interpreted in this context. A separate question which I do not address is whether increased enforcement activity leads to a net social benefit.

at the aggregate level. Imagine two hypothetical groups: entry-level attorneys in Boston, and entry-level attorneys in Chicago. Suppose the two groups are similar, except that for the Boston group, the potential salary in the next hierarchy level is higher. My results show that the Boston group would be more active: it would bring more civil actions, and a larger share of its attorneys would be engaged in enforcement. This is consistent with a tournament model, where employees compete to win a promotion, and large gaps between current and expected salary induce more effort (Lazear and Rosen (1981); Vroom (1964); Kepes et al. (2009)). The Boston group offers its attorneys better promotion value, which in turn seems to induce greater effort and result in more enforcement activity.

I repeat the analysis at the attorney level. Take two entry-level attorneys in Boston, A and B. Both have an opportunity to be promoted to the next hierarchy level, where the expected salary is higher, but A's salary is lower than B's, probably due to shorter tenure or lower starting salary. *A priori*, we would expect A to be less productive in terms of enforcement activity: he is paid less, and appears to be less experienced. But the analysis shows the opposite: A would bring more actions. This perhaps counter-intuitive result is in fact consistent with a tournament prediction.

The main result is that incentives predict increased enforcement activity, at the aggregate and the individual levels. These finding are robust to numerous measures of incentives and enforcement, expanded vector of controls, and alternative clustering methods. The regression specification rules out some of the most obvious alternative explanations; for example, the results are not driven by national enforcement trends, local economic conditions, or seniority. However, during the sample period, there were no significant exogenous shocks to the SEC's pay structure. I fully acknowledge this, and the tournament-like interpretation of the results should be applied with caution. Two main alternative stories emerge. *First*, the results could be driven by an unobserved case allocation mechanism which happens to correlate with the SEC's pay structure. *Second*, the "outside option" - the option to quit and move to the private sector - could drive simultaneously the pay structure and enforcement activity.

I proceed with a sequence of tests which appear to reasonably rule out those concerns

and to reinforce the tournament interpretation. Enforcement activity responds not only to changes in the incentive size (gap between current and expected salary), but also to changes in promotion probability. The incentive effect appears to be much stronger in smaller tournaments, where the number of candidates per position is smaller, and hence promotion probability is larger. Incentives explain not only the total number of civil actions, but also the number of "high impact" cases which presumably require more effort, such as those which resulted in criminal proceedings.[3] The SEC seems to reward enforcement internally: high volume of enforcement is associated with significantly higher promotion likelihood and significantly higher probability of receiving a cash bonus. At the same time, enforcement does not seem to predict departures from the SEC. Put differently, enforcement seems to lead to an "internal reward," much more than it leads to an "outside reward."

Taken together, the tests support the notion that tournament incentives can affect the effort levels of SEC attorneys. It highlights a potentially important friction stemming from the SEC's current pay regime: a compressed wage distribution, with moderate pay gaps between attorneys in consecutive ranks.

My paper contributes to the literature on financial market regulation, incentive compensation, and public sector productivity in three ways.

First, I uncover a novel channel which may affect financial market regulation: tournament among SEC enforcement staff. Studies typically focus on the rules governing financial markets, while less attention is being devoted to the incentives of government employees who are tasked with implementing those rules. This paper shows that the SEC's internal organization, namely promotion value and promotion chances, may cause frictions that seem to affect enforcement. Thus, the study of "frontline regulators" can enrich the discussion of financial market regulation.

Second, I illustrate how general compensation theories apply to a surprising population, namely SEC attorneys. Many studies focus on pay gaps within the private sector, with special attention to tournaments among corporate executives (Main et al. (1993);

[3]There is no consensus on what constitutes a "high impact" case, and I discuss various proxies below.

Kale et al. (2009); Kini and Williams (2012); Burns et al. (2017); Haß et al. (2015)), as well as equity perceptions among lower-paid employees (Cowherd and Levine (1992); Levine (1993); Trevor and Wazeter (2006); Breza et al. (2016)). My paper suggests that pay gaps and promotion opportunities can affect those employed in a state bureaucracy, which is non-trivial given the rigid pay structure and perhaps different profile of a typical government employee.

Third, this is the first study of tournament and output in the public sector. The nascent empirical literature on public sector incentives focuses on controlled experiments with special reward schemes, mainly in developing countries (Dal Bó et al. (2013); Ashraf et al. (2014); Olken et al. (2014); Geys et al. (2017); Burgess et al. (2017); Rasul and Rogger (2016)). There is also a thriving literature regarding performance-based awards for teachers, with mixed results (Lavy (2002); Muralidharan and Sundararaman (2011); Jacob and Levitt (2003); Behrman et al. (2015)). My paper, on the other hand, uses a large panel to study internal competition among U.S. regulators. Future research can study compensation incentives and the production of other public goods.

2 Theory and Institutional Setting

2.1 Theoretical Framework and Related Literature

What are the effects of internal pay gaps, within an organization, on employee effort? One class of models predicts positive effects. In a tournament context, employees compete with each other and the best relative performer wins a promotion Lazear and Rosen (1981); Lazear et al. (2012)). Similarly, in a rational updating setting, employees use the information on other employees' salaries to update their future pay prospects (Card et al. (2012)). In the psychology literature, expectancy theory states that employees believe that greater effort will lead to better performance and hence to a better pay (Vroom (1964); Kepes et al. (2009)). A competing class of theories predicts a negative effect of pay gaps on effort. This can be, for example, due to uncooperative behavior (Lazear (1989)), a sense of relative deprivation (Crosby (1976); Sweeney et al. (1990)),

or perceptions of inequity and discomfort (Adams (1963); Adams (1965)).

Empirically, compensation theories have been tested primarily on private sector employees. Many studies show how tournament effects persist among corporate executives (Main et al. (1993); Kale et al. (2009); Kini and Williams (2012); Burns et al. (2017); Haß et al. (2015); Coles et al. (2017)), and among professional athletes (Ehrenberg and Bognanno (1990); Becker and Huselid (1992); Simmons and Berri (2011)). Other studies report a mostly positive relationship between aggregated firm-level pay gaps and firm-level output (Hibbs Jr and Locking (2000); Mueller et al. (2017a); Mueller et al. (2017b)). There is also some empirical support for equity theories: underpayment to executives compared to the CEO is reportedly associated with greater turnover (Wade et al. (2006); Bloom and Michel (2002); Messersmith et al. (2011)), and there appears to be a negative relationship between pay inequality and job satisfaction, mainly among lower-paid employees (Cowherd and Levine (1992); Levine (1993); Clark and Oswald (1996); Trevor and Wazeter (2006); Card et al. (2012); Breza et al. (2016)).

Turning to the specific setting of the public sector, numerous theories lay out the unique challenges of designing an optimal incentive compensation scheme for civil servants.[4] For example, ambiguous task lists undermine the effectiveness of individual performance incentives (Wilson (1989); Dewatripont et al. (1999); Dixit (2002); Burgess and Ratto (2003)). Extrinsic monetary incentives can also crowd out the intrinsic motivation, which is presumably more prevalent among public sector employees (Weisbrod (1983); Besley and Ghatak (2005); Bénabou and Tirole (2006); Bryson et al. (2017)).

Empirical study of incentive compensation in the public sector is still nascent. To the best of my knowledge, there is no large-sample study about pay gaps effects in the U.S. public sector. With few exceptions, the focus in the literature is on controlled experiments with performance-based reward schemes, mainly in developing countries. For example, Dal Bó et al. (2013) find that higher wages attract more able applicants to public sector positions in Mexico, and Ashraf et al. (2014) show that rewards improve performance of health services employees in Zambia (see also Ashraf et al. (2016); Burgess and Ratto

[4]See a thorough theoretical discussion in Wilson (1989) and Dixit (2002), and a recent review in Bryson et al. (2017).

(2003); Geys et al. (2017); Nath (2015)). Other studies report that monetary rewards had no positive effect on public sector performance (Olken et al. (2014); Rasul and Rogger (2016); Bryson et al. (2017)), and in fact may crowd out the employees' intrinsic motivation (Bellé (2015); Deserranno (2015)). A related literature on performance awards for teachers provides mixed results (Lavy (2002); Muralidharan and Sundararaman (2011); Duflo et al. (2012); Luo et al. (2015); and Jacob and Levitt (2003); Glewwe et al. (2010); Fryer (2013); Behrman et al. (2015)).[5]

Lastly, in the SEC's context, existing studies look primarily into the choice of target firms by the SEC and consequences of the SEC's actions (Kedia and Philippon (2007)). No study, to the best of my knowledge, has looked into the effect of compensation incentives on the SEC's output. The closest are Kedia et al. (2015) and Choi et al. (2018), who explore the career paths of SEC attorneys, and Rajgopal and White (2017) who examine the profitability of stock trades executed by SEC employees.[6]

2.2 Institutional Setting

Compensation Scheme - Compensation at the SEC has three main components, similar to that of other civilian federal agencies. *Base pay* is determined by the employee's pay grade, and the range of each grade is identical across all SEC staff. The base pay is supplemented by *locality pay*, a fixed percentage determined by the employee's duty location.[7] The grade caps and locality rates slowly increase over time, and, as of 2018, the locality rate is between 15.36% (Salt Lake City) and 39.3% (San Francisco). Lastly, an SEC employee may be eligible to receive a *cash bonus*, distributed annually at the discretion of the employee's supervisors.[8]

Organization - The SEC consists of five Commissioners, appointed by the President of the United States. One of the Commissioners serves as Chairman. The Commission over-

[5]The closest studies of which I am aware are Bertrand et al. (2016) and Karachiwalla and Park (2017), regarding promotion prospects in India and China respectively. I reach different conclusions in a markedly different setting (U.S. employees involved in financial market regulation), relying on a broader theoretical motivation and a new identification strategy.

[6]See also Velikonja (2015) for a critical analysis of the SEC's published statistics.

[7]Locality pay was introduced in the early 1990s, implementing the Pay Comparability Act of 1990.

[8]A fourth component, *overtime payment*, is rarely observed in the sample (less than 0.3% of attorney-year observations received any overtime payments).

sees the SEC's operations, and also provides final approval over enforcement activities. The SEC's functional responsibilities are organized into 5 divisions and 23 offices. Each unit is headquartered in Washington D.C. In addition, the SEC maintains 11 regional offices throughout the United States. This paper is focused on attorneys who work at the Enforcement Division in Washington D.C. or in any of the 11 regional offices.

Enforcement Actions - An enforcement action, the main outcome variable, is a legal proceeding. It is filed by the SEC against a firm or an individual for violations of federal securities laws such as insider trading, accounting fraud and inadequate disclosure. The action is preceded by examination and investigation. Upon completion of the investigation, SEC staff present their findings to the Commission, which can authorize the staff to file an enforcement action. This paper is focused on *civil* actions, filed in U.S. District Court. The SEC can also bring *administrative* actions in front of an independent administrative law judge. In either venue the SEC can seek injunctions, civil monetary penalties, and return of illegal profits (disgorgement). The SEC can also refer the case to the Department of Justice, which may lead to criminal prosecution.

3 Data, Variables, and Summary Statistics

3.1 Data Sources

I collect and merge two novel datasets: employment data, and enforcement data. I use the former to construct the explanatory variables, including tournament incentives, and the latter to construct the main outcome variable.

Relying on multiple Freedom of Information Act requests, I compile a comprehensive employment dataset of all individuals who worked at the SEC at any point between 2002-2017. It includes annual information on location, occupation, base salary, pay grade, job title, tenure, overtime payments, bonus, and promotions. The outcome variable in this paper, enforcement, pertains only to attorneys at the Enforcement Division and regional offices (see below). Therefore, the final employment sample consists of 1,915 attorneys and 14,940 attorney-year observations.

The SEC commonly announces new enforcement actions in "litigation releases". Since 2002, those releases typically include a link to the underlying complaint. I thus collected all the complaints on the SEC's website, netting a sample of 2,934 complaints (the scraping was conducted in July 2018). Since the employment data is limited to the years 2002-2017, I excluded 132 complaints filed prior to 2002 or after 2017. The final enforcement sample includes 2,802 cases. On average, the SEC published 186 actions during a year, and a record of 289 actions in 2009 (see the time-series in Figure 2). Each complaint includes the names of SEC attorneys who worked on the case, as well as office affiliation (see a screenshot in Figure 1). I collect all the names and match them to the employment dataset. I was able to identify 99.6% of the attorneys. The matching confirmed that 96.9% of the attorneys who sign on the complaints work at the Enforcement Division or in one of the 11 regional offices. Therefore all the analysis in this paper is confined to those attorneys, to whom I refer as "enforcement attorneys." The final attorney-case dataset includes 10,870 attorney-case observations.

The sample used for this paper excludes civil actions that were not announced in a litigation release. According to the SEC's public figures, during the fiscal years 2004-2017 it filed a total of 3,038 civil actions, compared to 2,406 civil actions in my sample. The mean coverage rate is therefore 79.2%, at least during fiscal years 2004-2017 (see the time-series of coverage in Figure 2). In addition, my sample excludes administrative proceedings. While the orders issued in connection with those proceedings are readily available, it appears that the SEC rarely discloses the underlying legal documents with the attorneys' names (see Choi et al. (2018)).

3.2 Tournament and Ranks among SEC Attorneys

Tournament should be played with respect to the next potential promotion. It is therefore essential to understand who is competing against whom at the SEC, and for what prize.

Hierarchy at the SEC is reflected by pay grades. During the sample period, the SEC workforce was organized in a 20-grades system, but enforcement attorneys practically

occupy only the top 9 grades.[9] The hierarchy structure is illustrated in Figure 3 and Figure 4. Attorneys are almost always promoted one grade at a time (see Online Appendix). For example, an SK-13 attorney has 43.7% chance to be promoted to SK-14, and virtually 0% chance to be promoted more than one level. Moreover, as shown below in the summary statistics, the annual probability of switching offices (i.e., moving from Boston to New York) is 1.0%. Therefore, the natural way to define tournament is between attorneys who work at the same level *and* same office, and compete for a promotion to the next level at the same office. For example, all SK-13 attorneys in Chicago compete for SK-14 in Chicago.

3.3 Variable and Empirical Strategy

The goal is to regress a measure of enforcement on a measure of incentives. I start by introducing the two levels of analysis, and then discuss the variables and specifications.

Two samples - The analysis is conducted at two levels. In one level, the unit of observation is the individual attorney. This sample includes 1,915 attorneys and 14,940 attorney-year observations. I aggregate the individual attorneys into their respective grades within the office, thus creating an office-grade sample where the unit of observation is office-grade (for example, SK-12 in Boston). The office-grade sample includes 94 office-grades and 1,273 office-grade-year observations. I will discuss the relative advantages of both samples below.

Enforcement - For the office-grade sample, I define $Total_{o,g,t}$ to be the number of enforcement actions brought by attorneys in the office-grade o, g during year t, and $Dummy_{o,g,t}$ equals one if $Total_{o,g,t} \geq 1$. I also introduce $Participation_{o,g,t}$, which is the share of attorneys who participated in enforcement. For the attorney sample, I define $Total_{i,o,g,t}$ to be the number of enforcement actions brought by the attorney, and $Dummy_{i,o,g,t}$ equals one if $Total_{i,o,g,t} \geq 1$.[10] Note that all measures are based on counting

[9] The sample includes 69 attorney-year observations in lower grades (SK-7, SK-9 and SK-11), which I treat as if they are in SK-12.

[10] Note that $Participation_{o,g,t}$ is the mean of $Dummy_{i,o,g,t}$ in the year-office-grade. Typically, $Total_{o,g,t}$ is smaller than the sum of $Total_{i,o,g,t}$ in the year-office-grade, since multiple attorneys can collaborate on a single action.

the number of actions. This is a transparent and easily comparable summary of enforcement activity. At the same time, it abstracts from the heterogeneity among enforcement actions with regards to legal complexity or market impact. I consider alternative outcome variables below.

Incentive - For the office-grade sample, $incentive_{o,g,t}$ is a ratio. The denominator is $MedianSalary_{o,g,t}$, the median salary in office o, grade g, and time t. The numerator is $RegCap_{o,g+1,t}$, the highest available salary in the next grade $(g+1)$. For example, for SK-12 attorneys in Chicago, the incentive is the ratio between the top SK-13 Chicago salary and the median SK-12 Chicago salary.[11] Essentially, I consider the top $g+1$ salary as the potential prize for tournament winners. While the immediate pay raise upon promotion is more modest, the prize reflects the embedded option for future pay raises to the top of $g+1$ with nearly 100% probability. For robustness, I replace the numerator with the median salary in $g+1$. I refer to those variables as *top-to-median* and *median-to-median* incentives. The correlation between the two measures is 93.8%, and the main results remain unchanged. For the attorney sample, I put the attorney's individual salary in the denominator. I refer to this variable as the *individual incentive*.[12] For robustness, I replace the individual incentive with the natural log of the gap instead of ratio, and the main results remain unchanged.

Specification - In the office-grade sample, I estimate:

$$enforcement_{o,g,t} = \alpha \cdot incentive_{o,g,t-1} + \overrightarrow{\lambda}_{o,g,t-1} + \lambda_{o,g} + \lambda_t + \epsilon_{o,g} \tag{1}$$

The outcome is one of the three enforcement measures, and *incentive* is either top-to-median or median-to-median incentive. I include office-grade controls (number of attorneys and the median tenure), office-grade fixed effects, and year fixed effects. It implies that the results reflect changes in enforcement within the office-grade over time,

[11] One complication arises from SK-16, which is a unique grade at the SEC: an SK-14 attorney could be "jumped" to SK-15, a managerial position, or promoted to SK-16, which is not a managerial position but offers higher salaries than SK-15. Therefore, for an SK-14 attorney, I define the numerator to be the top salary among SK-16 attorneys which are "closer" in terms of hierarchy. For SK-15 and SK-16 attorneys, the numerator is the top salary of SK-17.

[12] Essentially, the *top-to-median* incentive is the median *individual* incentive.

when pay gaps relative to the next grade change. The explanatory variables are lagged, to rule out reverse causality, and standard errors are clustered at the office-grade level.

In the attorney sample, I estimate the following regression:

$$enforcement_{i,o,g,t} = \alpha \cdot incentive_{i,o,g,t-1} + \lambda_{o,g,t} + \epsilon_i \tag{2}$$

The outcome is one of the two enforcement measures, and *incentive* is the lagged individual incentive. $\lambda_{o,g,t}$ is year-office-grade fixed effects. This specification directly compares attorneys who compete in the same tournament, and the variation in their incentive comes from the individual salary: the lower salary, the higher the incentive. Standard errors are clustered at the attorney level.[13]

The attorney sample allows for a more granular analysis without losing statistical power, whereas the office-rank sample is significantly smaller. However, the office-rank sample has two main advantages. First, as opposed to the attorney sample, it allows me to abstract from the *individual* salary which is driven in part by the attorney's unique characteristics (I will discuss it more concretely in the results section). Second, conceptually, the tournament is likely designed at an aggregate level, by setting regulatory caps and promotion patterns across levels. In any event, by conducting the analysis in two different level I exploit different sources of variation, which could lend more credibility to the tournament argument.

As shown below, the main result is the existence of a significant positive relation between pay ratios (which I refer to as "incentives") and enforcement. This is consistent with a tournament interpretation, whereby larger ratios provide stronger incentives, which in turn lead to greater effort. However, I fully acknowledge the difficulty in properly identifying tournament effects at the SEC. Ideally, we would like to randomly assign pay ratios to grades and attorneys. But it is challenging to find a exogenous variation in the SEC's pay structure during the sample period. Absent such a shock, the concern is that higher pay ratios lead to more enforcement not because they provide greater tournament

[13]The Online Appendix considers alternative clustering methods and fixed effects specifications for Equation 1 and Equation 2.

incentives, but because of other reasons unrelated to the internal tournament. Although I cannot rule out this possibility in general, I will address specific alternative stories.

3.4 Summary Statistics

Table 1 and Table 2, and the accompanying Figure 5, Figure 6 and Figure 7, summarize the key statistics.

The majority of attorneys joined the SEC on or after 2003.[14] The median compensation is $186,000 (in 2017 USD), and the median tenure is 7 years. The median individual incentive is 1.20, which means that the median salary is 16.7% lower than the top salary in the next level ($1 - \frac{1}{1.20}$). Figure 7 describes the distribution of attorneys over hierarchy levels. Nearly 50% of the sample are in level 3, the highest non-managerial rank. Overall, 83% of the attorneys are in non-managerial positions (levels 1-3; see detailed distribution in Figure 7). Nearly 70% of attorneys participate in at least one action during their career. The annual enforcement probability (at least one action) is 32.3%, and the median (conditional on bringing any action) is 1, which is why I consider $Dummy_{i,o,g,t}$ to be the main outcome variable at the attorney level. The annual promotion rate is 10.1%, and 54.9% of the attorneys earned at least one promotion during the sample period. The annual departure rate is 5.1%, and nearly 40% of the sample left the SEC during the sample period.

In the office-grade sample, the median rank includes 6 attorneys, with a median salary of $200,000 and a cap of $209,000 (in 2017 USD). The top-to-median and median-to-median incentives are 1.20 and 1.14, respectively, and both are right skewed. 65% of the ranks bring at least one action during the year, and the median rank (conditional on bringing any action) has 8 actions per year. On average, 36% of attorneys within the office-grade participate in enforcement, and generally higher ranks show higher degree of participation (although the trend is not linear).

Lastly, I look into the sources of variation in attorney-level salaries. To conserve space, the results are reported in the Online Appendix. Year-office-grade fixed effects

[14] Although the sample is restricted to 2002-2017, the data includes accession dates even for attorneys who were recruited prior to 2002.

can in themselves explain 80% of the variation. In addition, contemporary salary is positively related to starting salary in the rank and to tenure in rank. Those results are not surprising and reflect the SEC's pay structure, where each rank is capped above and below, and employees receive annual pay raises almost every year. Employee-specific time-invariant characteristic explain additional 3% of the variation. The salary upon promotion (i.e., starting salary in the rank) is strongly correlated with last year's salary (before the promotion took place), and year-office-grade fixed effects explains almost all the residual variation. 82% of the variation in starting salary at the SEC can be explained by year-office-grade fixed effects.

4 Results

4.1 Main Result: Enforcement and Incentives

To obtain a visual impression, Figure 8 plots the probability of an office-grade bringing an enforcement action ($Dummy_{o,g,t}$) against the lagged top-to-median incentive, and the probability of an attorney bringing an enforcement action ($Dummy_{i,o,g,t}$) against the lagged individual incentive. Clearly, there is a positive relationship between incentives and enforcement probability, at the aggregated office-grade level and also at the granular attorney level.

Table 3 confirms this visual impression using regression analysis. Starting with the office-grade sample, I test the relation between incentives and the three measures of enforcement: dummy, total activity, and participation share (Equation 1). Essentially, I study the "tournament between tournaments:" how enforcement output differs across ranks, as a function of the compensation incentives each rank offers to its attorneys. In one set of regressions I include year dummies, where the effect is identified within the office-grade over time . In the second set I include year-office dummies, thus controlling for local time variant conditions.

The results show that incentives have a significant, positive impact on enforcement. They predict the probability of non-zero enforcement activity, the scope of enforcement

activity, and the share of attorneys who would participate in enforcement. The estimated economic magnitude of the effect is non-trivial. For example, 1% increase in the incentive is associated with 1%-1.3% increase in total enforcement activity. One standard deviation increase in the incentive, relative to the mean, is associated with 13%-18% increase in enforcement activity.[15]

Taking the analysis one step further, I study whether individual incentives can predict attorney-level outcomes (Equation 2): total activity and enforcement probability. The results are summarized in Table 4. The correlation between individual incentive and individual enforcement is positive and significant. Note that in columns 3 and 6 I include year-office-grade fixed effects, directly comparing attorneys who work at the same office, same year and same rank, all competing in the same tournament for the same prize. Attorneys who work at the same office and rank exhibit different propensity to bring any enforcement action, depending on their incentive. One standard deviation increase in the incentive is associated with 2.4 percentage point increase in enforcement probability, which is 7.4% increase over the unconditional probability.[16] The results hold in less tight specifications, when comparing attorneys nationally (year dummies) or within the office (year-office dummies).

I perform a battery of robustness tests to confirm the results. In the office-grade sample (Equation 1), replacing the top-to-median incentive with the median-to-median incentive, and using three alternative enforcement measures, does not change the results. I use different clustering methods, such as office-grade-year; the standard errors increase, but the results remain mostly significant. In the attorney sample (Equation 2), using logs instead of levels, gaps instead of ratios, and alternating between dummy and total actions, does not change the results. Different clustering methods, such as attorney-year, reveal that the choice to cluster by employee leads to the most conservative estimates. All the main results hold when I estimate a Probit model instead of LPM (for the dummy outcome), and when I consider alternative hierarchy structures.[17]

[15]The average and standard deviation of top-to-median incentive are $(1.22, 0.166)$, respectively, and $0.969 * \frac{0.166}{1.22} = 0.132$.

[16]The standard deviation of the individual incentive is 0.158, and $0.188 * \frac{0.158}{0.326} = 0.074$.

[17]I.e., assuming SK-14 attorneys compare their salaries to SK-15 or to the highest among SK-15 and

To summarize, large pay gaps are correlated with more enforcement activity. At a first glance, these results appear counter-intuitive. Consider two level-1 Boston attorneys, A and B, where A has lower salary and hence higher pay gap than B. The lower salary of A is plausibly driven by shorter tenure and/or lower entry salary, compared to B. *A priori*, we would expect A to be less productive in terms of enforcement activity: he is paid less, and appears to be less experienced. But the unintuitive result is in fact consistent with the compensation literature I laid out earlier. An office-grade with larger pay gaps offers its attorneys better promotion opportunities, which in turn could induce greater effort and result in more enforcement activity. Taken together, the results highlight a potentially important friction stemming from the SEC's current pay regime: a compressed wage distribution, with moderate pay gaps between attorneys in consecutive ranks.

I fully acknowledge the endogeneity concern in the analysis. The ideal experiment would require random assignment of salaries to attorneys, which in turn would create random pay gaps in the office, and allow us to measure the effect of tournament incentives without bias. Due to the lack of a significant shock to the SEC's pay structure during the sample period, the tournament-like interpretation of the results should be applied with caution. In the next part of the paper I present a sequence of additional results, that could help address what appears to be the two most reasonable alternative stories. *First*, enforcement activity does not reflect a meaningful effort metric, and the results are driven by an unobserved case allocation mechanism which happens to correlate with the SEC's pay structure. *Second*, any attorney has an option to quit and join a private law firm, and this "outside option" is driving both the pay structure and enforcement activity.

4.2 Tournament Incentives and Case Outcomes

Not all enforcement actions are born equal. Some involve complicated legal arguments while others are relatively straightforward. Some actions have large impact on markets, while some have limited impact. This heterogeneity could lead to a potential measurement

SK-16. See Online Appendix.

error, since the number of enforcement actions in itself cannot accurately reflect the level of effort involved.

It seems that no consensus exists on the definition of a "difficult" or an "important" case. I use three proxies (see Kedia et al. (2015)): cases with parallel criminal proceedings; cases with civil money penalty; and cases with industry bars (for example, a permanent bar from appearing or practicing before the Commission as an accountant). Barring defendants from the industry, bringing criminal charges, and obtaining an order to pay a significant money penalty seem to be a reasonable proxy for an especially impactful enforcement action. I collect that information for the sub-sample of 1,135 settled enforcement actions. 89.8% of those cases were immediately settled, and the rest were settled later on. 37.7% resulted in barring individuals from the industry, including 7.9% with permanent bar, and 18.4% were accompanied by criminal proceedings by the Department of Justice. 81.8% of the cases resulted in orders to pay penalty or disgorge ill-gotten gains, and the median is $224,000 in 2017 USD (see Online Appendix).

I construct two sets of outcome variables based on this partial data. One is a set of dummies, which equals one if the attorney's enforcement activity resulted in at least one industry bar; was accompanied by a parallel criminal proceeding; or resulted in disgorgement or penalty. The second is a set of continuous variables, which are the total number of industry bars; the total number of actions with parallel criminal proceedings; and the natural log of monetary awards in 2017 USD. I regress the new outcome variables on incentives. The results are summarized in Table 5. They show that tournament can explain not only enforcement activity in general, but also the propensity and scope of bringing "high impact" cases. For example, one standard deviation increase in the incentive is associated with 1.4 percentage point increase in the probability of a criminal proceeding, which is 7.4% increase over the unconditional probability.[18]

To summarize, the results in this section seem consistent with an interpretation of effort. Presumably, it takes more effort to successfully conduct a complex investigation

[18]one standard deviation increase in the incentive is associated with 2.2, 1.4, and 4.7 percentage point increase in the probability of industry bar, criminal proceedings and monetary awards, respectively, which is 5.9%, 7.4%, and 5.7% increase over the unconditional probability.

that leads to an enforcement action with more grave outcomes.

4.3 Enforcement and Promotions

A key assumption in the paper is that enforcement improves the attorney's promotion chances. Otherwise, even the most generous tournament incentives should have zero effect on enforcement, and any correlation could not reasonably have a causal interpretation. In this section I introduce evidence which supports the assumption, showing that enforcement is associated with greater likelihood of promotion.

First, as mentioned earlier, an attorney has a 54.4% chance to be promoted at least once during his or her entire career (see Table 1). This probability varies significantly between attorneys who brought at least one enforcement action during their career, and attorneys who did not. The former have a 58.1% chance of being promoted at least once during their career, compared to 46.4% chance for the latter, and the difference is statistically significant at the 1% level. *Second*, Figure **??** studies the probability that an attorney would be promoted at least once during his first x years at the SEC. I separate "enforcers" from "non-enforcers", where the former are attorneys who brought at least one action *till that point*. It appears that the promotion probability of "enforcers" is greater than "non-enforcers". For example, within the group of 2^{nd} year attorneys, 36.7% of the "enforcers" were promoted versus 23.6% of "non-enforcers". *Third*, Table 7 estimates whether enforcement predicts promotions in the panel. The outcome equals one if the attorney was promoted to the next rank during the year, controlling for tenure and past promotions. Most importantly, all specifications include year-office-grade fixed effects. Essentially I am comparing attorneys who compete in the same tournament, i.e. all level-1 attorneys in Chicago in 2010, and try to predict who would be the "winners" of the tournament. It turns out that there is a significant positive relation between enforcement and winning the tournament: bringing at least one enforcement action in time $t-1$ predicts 1.8%-2.2% increase in promotion probability at time t. That relation holds even within employee, i.e. it is not affected by time-invariant employee-specific characteristics such as skills and motivation.

The results make room for the possibility that promotions are a direct reward for bringing enforcement actions. However, for the purpose of this paper, the causal link between enforcement and promotion does not have to be as straightforward. An alternative interpretation is that enforcement actions are a way to "stand out" from the crowd in a bureaucracy, and that attorneys can signal their skills and determination to their supervisors by bringing enforcement actions. I do not have direct evidence one way or another, but either explanation would suffice for the purpose of this paper.

4.4 Enforcement and Incentive Alignment

The compensation scheme at the SEC is fairly structured and tenure-based, dictated by salary caps and locality pay adjustments. However, a small portion of the paycheck is comprised of incentive awards, i.e. bonus. Bonus recipients are employees who were judged by their superiors to perform above and beyond normal job requirements. For example, 5 U.S.C 45 is titled "Incentive Awards," and specifies that such award may be awarded to an employee who "by his suggestion, invention, superior accomplishment, or other personal effort contributes to the efficiency, economy, or other improvement of Government operations" (see also U.S. Government Accountability Office, 2013).

Bonus data is available since 1996, but award distribution has virtually stopped in 2010 as part of a government-wide pay freeze. Therefore the sample in this subsection is limited to the years 2002-2009, including. The Online Appendix provides key statistics. 61.7% of SEC enforcement attorneys earned a bonus. Conditional on receiving one, the average bonus was $3,153 in 2017 USD, or 1.6% of the attorney's base compensation.

In Table 8 I estimate whether enforcement predicts bonus, in a similar fashion to Table 7. The outcome equals one if the attorney received any bonus by the end of the year, controlling for tenure and past bonus. All specifications include year-office-grade fixed effects, again comparing attorneys who compete in the same tournament. The coefficient of interest is $enforcement$. There is a significant positive relation between enforcement and winning a bonus: bringing at least one enforcement action during the year predicts 5.4-11.3 percentage point increase in bonus probability by the end of the

year. That relation holds even within employee, i.e. it is not affected by time-invariant employee-specific characteristics such as skills and motivation.

To summarize, enforcement is associated with greater likelihood of winning a bonus, in recognition of excellent performance. Recall that similar results were obtained by regressing promotion on enforcement. This seem to point in the same direction. Two of the SEC's internal performance metrics appear to respond to enforcement activity: attorneys who exhibit more enforcement activity are more likely to be promoted and to win bonuses. This supports the notion that tournament incentives lead to greater effort.

In the Online Appendix I test whether bonus in itself can predict future enforcement activity. I estimate Equation 2 with the additional variable *Bonus*, an indicator which equals one if the attorney received a bonus award. The sample is limited to the years 2002-2009, and as before the explanatory variables are lagged. Bonus indeed predicts future enforcement activity, albeit in some specifications the significance is below the 10% level. Most importantly, the explanatory power of tournament incentives is not diminished, and is still significant statistically and economically.

4.5 Winning Probability and Incentive Size

In a tournament setting pay gaps matter, but so does the likelihood of promotion. In particular, a higher probability of winning increases the incentive effect of a given pay gap (Coles et al. (2017)).

At the SEC, promotion probability is tied (among other things) to the number of attorneys in the office-grade who compete for that promotion. Data shows that office-grades above (below) the median size promote 11% (22%) of their attorneys, and the differences are statistically significant. More precisely, the elasticity of promotions to size is between 0.24 to 0.41, and in any case significantly less than 1 (Table 9). It implies that, when the number of promotion candidates increases, the unconditional probability of promotion decreases.

Relying on this finding, the prediction is that a given incentive would have differential effect: higher impact in small tournaments (less attorneys in the office-grade), lower

impact in large tournaments (more attorneys in the office-grade). I test this prediction in two ways. In the office-grade sample, I split the sample by the median size (6 attorneys) and estimate Equation 1 separately for small and large tournaments. Indeed, the effect is significant and strong in small tournaments, but insignificant and weak in large tournaments. In the attorney sample, I regress enforcement on the interaction of incentive and the number of attorneys in the office. The prediction is that, as the number of attorneys increases, the incentive effect of any given pay ratio would decrease. Indeed, the results in Table 11 illustrate this mechanism. The coefficient on *incentive* is positive, but the coefficient on $attorneys \cdot incentive$ is negative, and all are highly significant. The implication is that, holding the individual incentive fixed and moving from the 25^{th} to the 75^{th} percentile size, enforcement probability drops by roughly 4%.

Overall, the evidence in this section is consistent with tournament predictions. Effort levels are adjusted based on the incentive size (gap relative to the "prize"), and also in response to change in promotion probability. At the SEC, an identical tournament incentive would have a differential effect on enforcement, depending on the number of attorneys competing for promotion.

4.6 Tournament and Outside Job Opportunities

It is reasonable to assume that any SEC enforcement attorney can obtain a job in the private sector, with value $outsd_{i,o,g,t}$. The concern is that $outsd_{i,o,g,t}$ is correlated with enforcement activity *and* with tournament incentives, which would bias the estimation of tournament effects. For example, suppose the SEC raises salary caps for each level to match private sector salaries, *and* law firms prefer to hire aggressive enforcement attorneys. In this scenario *incentive* would increase with $outsd_{i,o,g,t}$, since the regulatory cap (the numerator) increases; and enforcement activity increases with $outsd_{i,o,g,t}$, as attorneys seek to improve their chances of receiving an outside offer. As a result, omitting $outsd_{i,o,g,t}$ would lead to upward bias of the estimated tournament effect.

The institutional setting at the SEC could alleviate some of those concerns. The regulatory cap for each pay grade is set at the *national* level, regardless of local economic

conditions; and the locality pay is *identical* for all attorneys who work at the office, regardless of rank. Put differently, there does not seem to be an adjustment mechanism at the office-grade level, which would allow for a "bidding contest" between the SEC and the private sector. Among attorneys who work at the same office and in a similar rank, the variation in salary is driven by tenure and initial salary. It appears that neither component should predict lower $outsd_{i,o,g,t}$. If anything, higher starting salary and longer tenure should predict better job offers.

The expected outside salary is unobserved and its correlation with enforcement and incentive cannot be tested. However, the data in my possession includes departures, which presumably correlate with the unobserved outside option (attorney is more likely to leave when the outside option is more valuable). I perform the following two tests.

First, I control explicitly for departures at the office-grade level. This could address the concern that the outside option creates a bias in estimating the coefficient on *incentive*. Essentially I estimate Equation 1 with an additional control variable, *Departures*, which equals one if at least one attorney within the office-grade left the SEC. The results are summarized in Table 12. Clearly, the main results in the paper are not affected by the inclusion of this control: the variation in outside options, captured by departure rates, does not seem to predict enforcement and does not seem to change the effect of tournament incentives on enforcement.

A complementary test, reported in the Online Appendix, looks into the relation between enforcement and departures. At the attorney level, the question is whether attorneys who eventually left the SEC were more engaged in enforcement activity during their tenure at the agency. I estimate whether enforcement predicts departures, controlling for tenure and with year-office-grade fixed effects. Overall, the correlation between enforcement and departure appears to be negative: attorneys with increased enforcement activity seem less likely to depart. If departure is considered a proxy for $outsd_{i,o,g,t}$, these results suggest that enforcement activity is in fact associated with lower values of $outsd_{i,o,g,t}$. This is in clear contrast with the results in Table 7, which show a significant positive correlation between enforcement and internal promotion. Put differently, the

internal reward for enforcement appears to be much more significant, statistically and economically, than the potential outside reward, and the latter might in fact be negative.

5 Conclusion

Tournament incentives among SEC attorneys seem to affect financial market regulation. In particular, changes in the expected prize (salary upon promotion) and in promotion probability seem to predict changes in enforcement activity. At the aggregate level, SEC ranks where attorneys have better promotion opportunities exhibit higher volume of enforcement and higher participation in enforcement. At the individual level, attorneys with larger tournament incentives are more likely to participate in enforcement. Additional results seem to reinforce the tournament interpretation of these findings, whereby incentives increase effort in order to win the tournament. For example, the SEC seems to internally reward its attorneys for their enforcement activity, as reflected in their promotion and bonus rates.

Mine is the first study on tournament inside the public sector, and its wider implications for the economy. Against the backdrop of the "revolving door" discussion, which typically emphasizes the disparity between public and private sector salaries (U.S. Securities and Exchange Commission, 2002; Bond and Glode (2014); Greszler et al. (2016)), this paper shows how internal compensation incentives could induce more output. It is a potential step toward understanding the social costs of distortions in the governmental compensation scheme. Relying on the methodology of this paper, future research can extend the analysis to study the effects of compensation schemes on the production of various public goods.

References

J Stacy Adams. Towards an understanding of inequity. *The Journal of Abnormal and Social Psychology*, 67(5):422, 1963.

J Stacy Adams. Inequity in social exchange. In *Advances in experimental social psychology*, volume 2, pages 267–299. Elsevier, 1965.

Nava Ashraf, Oriana Bandiera, and Scott S Lee. Awards unbundled: Evidence from a natural field experiment. *Journal of Economic Behavior & Organization*, 100:44–63, 2014.

Nava Ashraf, Oriana Bandiera, and Scott S Lee. Do-gooders and go-getters. Technical report, Working paper, 2016.

Brian E Becker and Mark A Huselid. The incentive effects of tournament compensation systems. *Administrative Science Quarterly*, pages 336–350, 1992.

Jere R Behrman, Susan W Parker, Petra E Todd, and Kenneth I Wolpin. Aligning learning incentives of students and teachers: results from a social experiment in mexican high schools. *Journal of Political Economy*, 123(2):325–364, 2015.

Nicola Bellé. Performance-related pay and the crowding out of motivation in the public sector: a randomized field experiment. *Public Administration Review*, 75(2):230–241, 2015.

Roland Bénabou and Jean Tirole. Incentives and prosocial behavior. *American economic review*, 96(5):1652–1678, 2006.

Marianne Bertrand, Robin Burgess, Arunish Chawla, and Guo Xu. The costs of bureaucratic rigidity: Evidence from the indian administrative service. *Unpublished working paper. University of Chicago*, 2016.

Timothy Besley and Maitreesh Ghatak. Competition and incentives with motivated agents. *American economic review*, 95(3):616–636, 2005.

Matt Bloom and John G Michel. The relationships among organizational context, pay dispersion, and among managerial turnover. *Academy of Management Journal*, 45(1): 33–42, 2002.

Philip Bond and Vincent Glode. The labor market for bankers and regulators. *The Review of Financial Studies*, 27(9):2539–2579, 2014.

Emily Breza, Supreet Kaur, and Yogita Shamdasani. The morale effects of pay inequality. *The Quarterly Journal of Economics*, 2016.

Alex Bryson, John Forth, and Lucy Stokes. How much performance pay is there in the public sector and what are its effects? *Human Resource Management Journal*, 27(4): 581–597, 2017.

Simon Burgess and Marisa Ratto. The role of incentives in the public sector: Issues and evidence. *Oxford review of economic policy*, 19(2):285–300, 2003.

Simon Burgess, Carol Propper, Marisa Ratto, and Emma Tominey. Incentives in the public sector: Evidence from a government agency. *The Economic Journal*, 127(605), 2017.

Natasha Burns, Kristina Minnick, and Laura Starks. Ceo tournaments: A cross-country analysis of causes, cultural influences, and consequences. *Journal of Financial and Quantitative Analysis*, 52(2):519–551, 2017.

David Card, Alexandre Mas, Enrico Moretti, and Emmanuel Saez. Inequality at work: The effect of peer salaries on job satisfaction. *American Economic Review*, 102(6): 2981–3003, 2012.

Stephen J Choi, G Mitu Gulati, and Adam C Pritchard. Should i stay or should i go? the gender gap for sec attorneys. 2018.

Andrew E Clark and Andrew J Oswald. Satisfaction and comparison income. *Journal of public economics*, 61(3):359–381, 1996.

Jeffrey L Coles, Zhichuan Li, and Albert Y Wang. Industry tournament incentives. *The Review of Financial Studies*, 31(4):1418–1459, 2017.

Douglas M Cowherd and David I Levine. Product quality and pay equity between lower-level employees and top management: An investigation of distributive justice theory. *Administrative Science Quarterly*, pages 302–320, 1992.

Faye Crosby. A model of egoistical relative deprivation. *Psychological review*, 83(2):85, 1976.

Ernesto Dal Bó, Frederico Finan, and Martín A Rossi. Strengthening state capabilities: The role of financial incentives in the call to public service. *The Quarterly Journal of Economics*, 128(3):1169–1218, 2013.

Erika Deserranno. Financial incentives as signals: Experimental evidence from the recruitment of health promoters. 2015.

Mathias Dewatripont, Ian Jewitt, and Jean Tirole. The economics of career concerns, part ii: Application to missions and accountability of government agencies. *The Review of Economic Studies*, 66(1):199–217, 1999.

Avinash Dixit. Incentives and organizations in the public sector: An interpretative review. *Journal of human resources*, pages 696–727, 2002.

Esther Duflo, Rema Hanna, and Stephen P Ryan. Incentives work: Getting teachers to come to school. *American Economic Review*, 102(4):1241–78, 2012.

Ronald G Ehrenberg and Michael L Bognanno. The incentive effects of tournaments revisited: Evidence from the european pga tour. *ILR Review*, 43(3):74–S, 1990.

Roland G Fryer. Teacher incentives and student achievement: Evidence from new york city public schools. *Journal of Labor Economics*, 31(2):373–407, 2013.

Benny Geys, Tom-Reiel Heggedal, and Rune J Sørensen. Are bureaucrats paid like ceos? performance compensation and turnover of top civil servants. *Journal of Public Economics*, 152:47–54, 2017.

Paul Glewwe, Nauman Ilias, and Michael Kremer. Teacher incentives. *American Economic Journal: Applied Economics*, 2(3):205–27, 2010.

Rachel Greszler, James Sherk, and Alan Krueger. Why it is time to reform compensation for federal employees. *Heritage Foundation Backgrounder*, (3139), 2016.

Lars Helge Haß, Maximilian A Müller, and Skrålan Vergauwe. Tournament incentives and corporate fraud. *Journal of Corporate Finance*, 34:251–267, 2015.

Douglas A Hibbs Jr and Håkan Locking. Wage dispersion and productive efficiency: Evidence for sweden. *Journal of Labor Economics*, 18(4):755–782, 2000.

Brian A Jacob and Steven D Levitt. Rotten apples: An investigation of the prevalence and predictors of teacher cheating. *The Quarterly Journal of Economics*, 118(3):843–877, 2003.

Jayant R Kale, Ebru Reis, and Anand Venkateswaran. Rank-order tournaments and incentive alignment: The effect on firm performance. *The Journal of Finance*, 64(3): 1479–1512, 2009.

Naureen Karachiwalla and Albert Park. Promotion incentives in the public sector: evidence from chinese schools. *Journal of Public Economics*, 146:109–128, 2017.

Simi Kedia and Thomas Philippon. The economics of fraudulent accounting. *The Review of Financial Studies*, 22(6):2169–2199, 2007.

Simi Kedia, Kevin Koh, Shivaram Rajgopal, et al. The revolving door and the sec's enforcement outcomes: Initial evidence from civil litigation. *Journal of Accounting and Economics*, 60(2-3):65–96, 2015.

Sven Kepes, John Delery, and Nina Gupta. Contingencies in the effects of pay range on organizational effectiveness. *Personnel Psychology*, 62(3):497–531, 2009.

Omesh Kini and Ryan Williams. Tournament incentives, firm risk, and corporate policies. *Journal of Financial Economics*, 103(2):350–376, 2012.

Victor Lavy. Evaluating the effect of teachers' group performance incentives on pupil achievement. *Journal of political Economy*, 110(6):1286–1317, 2002.

Edward P Lazear. Pay equality and industrial politics. *Journal of political economy*, 97 (3):561–580, 1989.

Edward P Lazear and Sherwin Rosen. Rank-order tournaments as optimum labor contracts. *Journal of political Economy*, 89(5):841–864, 1981.

Edward P Lazear, Paul Oyer, Robert Gibbons, and D John Roberts. Handbook of organizational economics, 2012.

David I Levine. What do wages buy? *Administrative Science Quarterly*, pages 462–483, 1993.

Renfu Luo, Grant Miller, Scott Rozelle, Sean Sylvia, and Marcos Vera-Hernández. Can bureaucrats really be paid like ceos? school administrator incentives for anemia reduction in rural china. Technical report, National Bureau of Economic Research, 2015.

Brian GM Main, Charles A O'Reilly III, and James Wade. Top executive pay: Tournament or teamwork? *Journal of Labor Economics*, 11(4):606–628, 1993.

Jake G Messersmith, James P Guthrie, Yong-Yeon Ji, and Jeong-Yeon Lee. Executive turnover: The influence of dispersion and other pay system characteristics. *Journal of Applied Psychology*, 96(3):457, 2011.

Holger M Mueller, Paige P Ouimet, and Elena Simintzi. Wage inequality and firm growth. *American Economic Review*, 107(5):379–83, 2017a.

Holger M Mueller, Paige P Ouimet, and Elena Simintzi. Within-firm pay inequality. *The Review of Financial Studies*, 30(10):3605–3635, 2017b.

Karthik Muralidharan and Venkatesh Sundararaman. Teacher performance pay: Experimental evidence from india. *Journal of political Economy*, 119(1):39–77, 2011.

Anusha Nath. Bureaucrats and politicians: Electoral competition and dynamic incentives. Technical report, IED Working Paper, 2015.

Benjamin A Olken, Junko Onishi, and Susan Wong. Should aid reward performance? evidence from a field experiment on health and education in indonesia. *American Economic Journal: Applied Economics*, 6(4):1–34, 2014.

Shivaram Rajgopal and Roger M White. Stock trades of securities and exchange commission employees. *The Journal of Law and Economics*, 60(3):441–477, 2017.

Imran Rasul and Daniel Rogger. Management of bureaucrats and public service delivery: Evidence from the nigerian civil service. *The Economic Journal*, 2016.

Rob Simmons and David J Berri. Mixing the princes and the paupers: Pay and performance in the national basketball association. *Labour Economics*, 18(3):381–388, 2011.

Paul D Sweeney, Dean B McFarlin, and Edward J Inderrieden. Using relative deprivation theory to explain satisfaction with income and pay level: A multistudy examination. *Academy of Management Journal*, 33(2):423–436, 1990.

Charlie O Trevor and David L Wazeter. A contingent view of reactions to objective pay conditions: interdependence among pay structure characteristics and pay relative to internal and external referents. *Journal of Applied Psychology*, 91(6):1260, 2006.

Urska Velikonja. Reporting agency performance: Behind the sec's enforcement statistics. *Cornell L. Rev.*, 101:901, 2015.

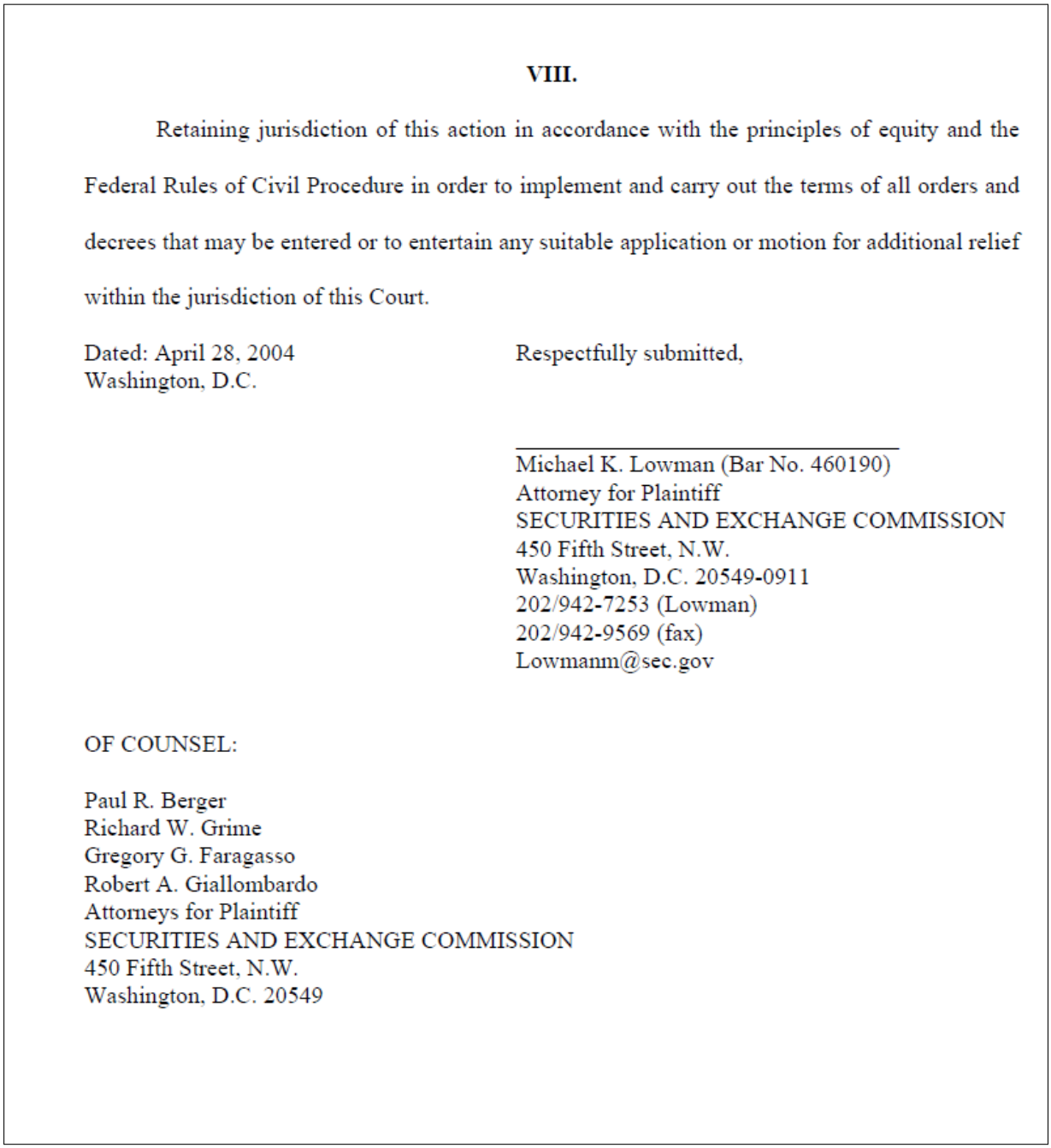
Victor Harold Vroom. Work and motivation. 1964.

James B Wade, Charles A O'Reilly III, and Timothy G Pollock. Overpaid ceos and underpaid managers: Fairness and executive compensation. *Organization Science*, 17 (5):527–544, 2006.

Burton A Weisbrod. Nonprofit and proprietary sector behavior: Wage differentials among lawyers. *Journal of Labor Economics*, 1(3):246–263, 1983.

James Q Wilson. Bureaucracy: What government agencies do and why they do it. 1989.

Figure 1: **Example of Civil Enforcement Action**



VIII.

Retaining jurisdiction of this action in accordance with the principles of equity and the Federal Rules of Civil Procedure in order to implement and carry out the terms of all orders and decrees that may be entered or to entertain any suitable application or motion for additional relief within the jurisdiction of this Court.

Dated: April 28, 2004
Washington, D.C.

Respectfully submitted,

_____
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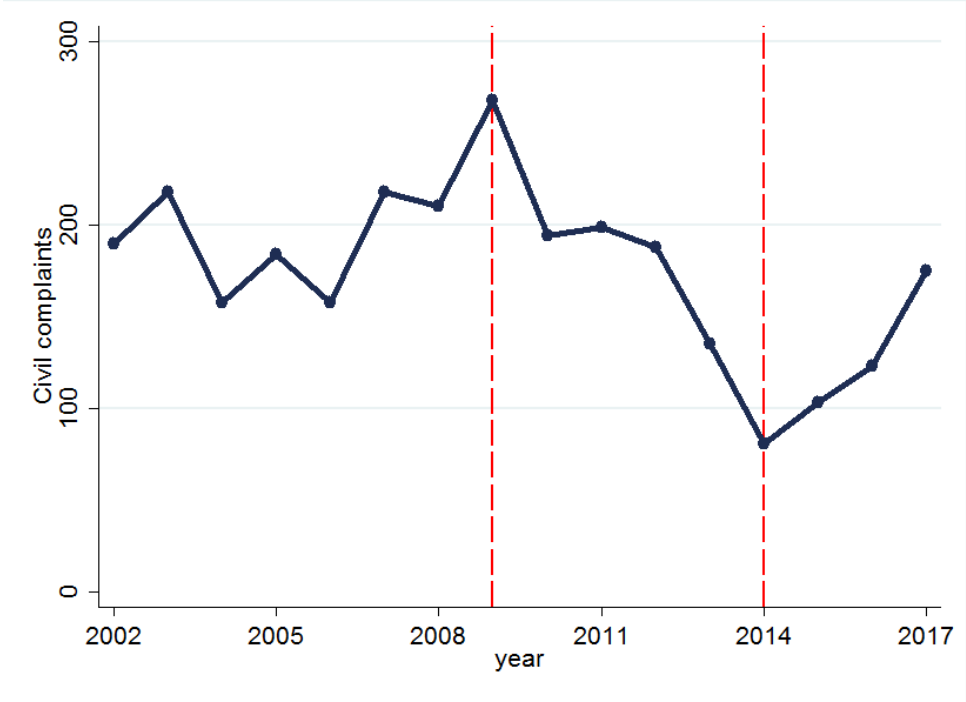
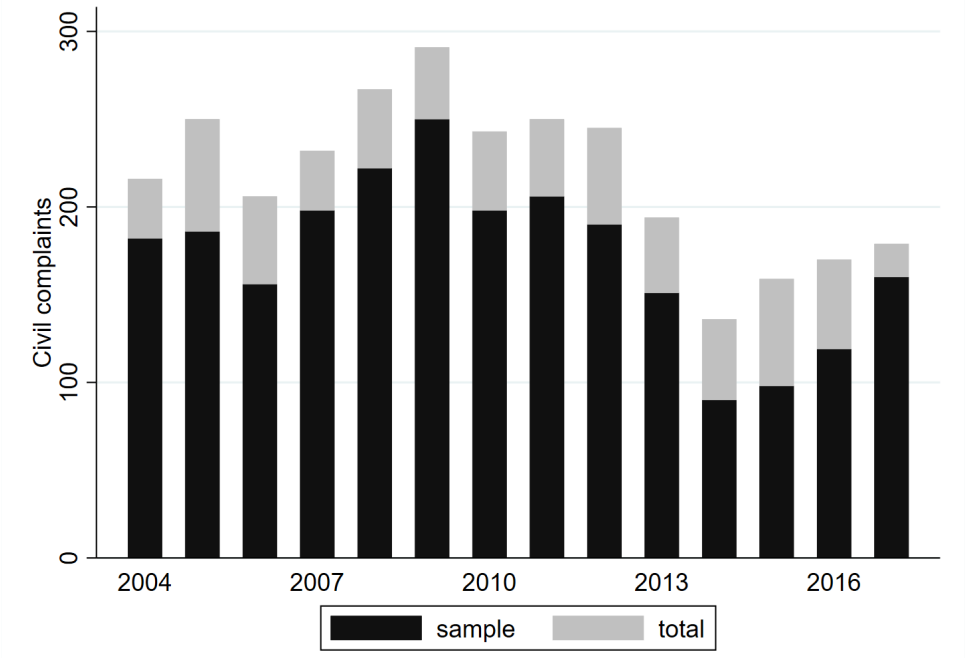
The signature page of an enforcement action filed on April 2004 in the U.S. District Court for the District of Columbia against Barry Richard Kusatzky, the former controller of California Amplifier. On February 2006, the Court entered a settled final judgment against Kusatzky for falsifying the company's financial statements and insider trading. The final judgment imposed a permanent officer and director bar and ordered payment of partial disgorgement of $25,000.

Figure 2: **Enforcement Activity at the SEC**

Panel A: **Time-series**

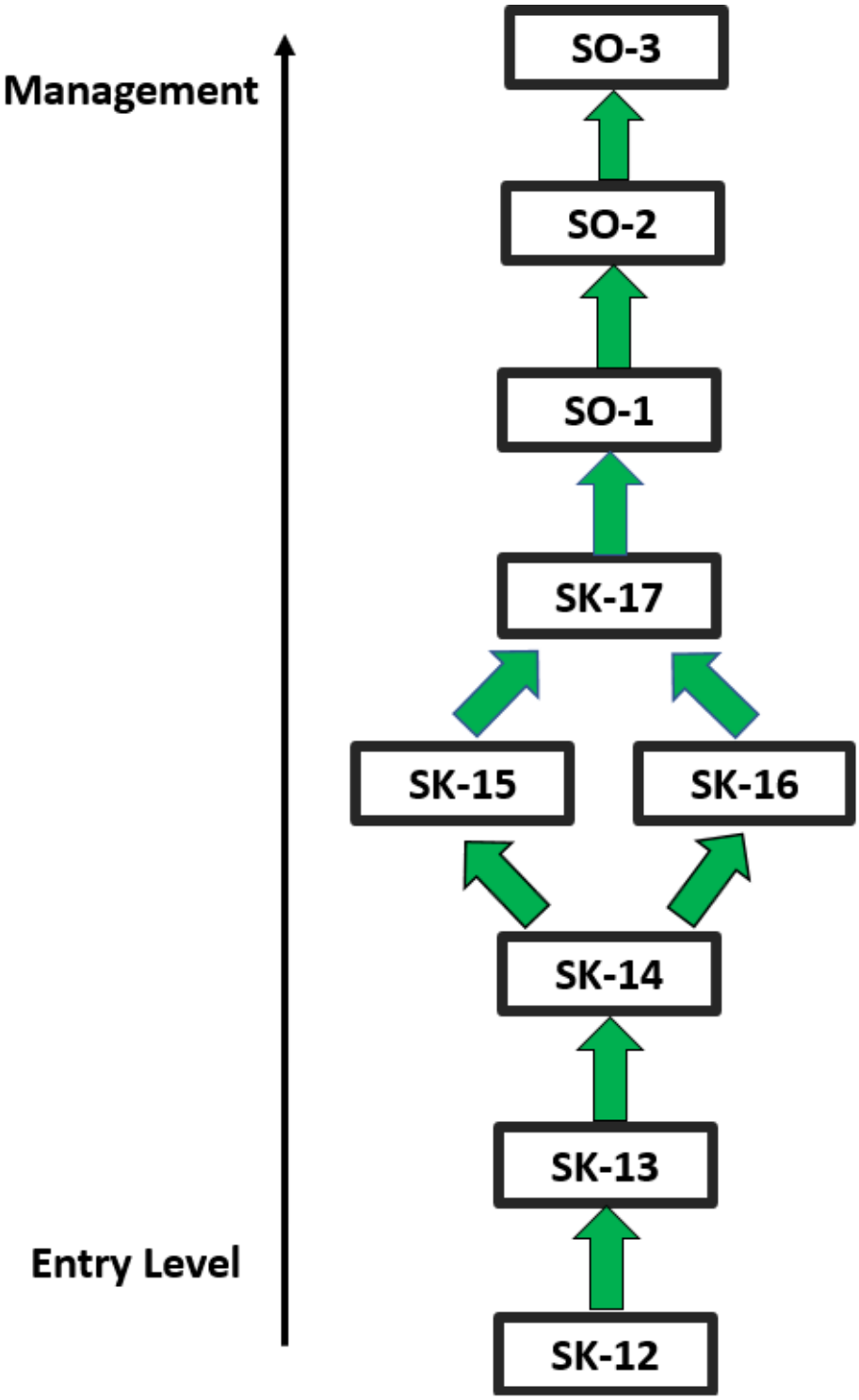


Panel B: **Sample selection**



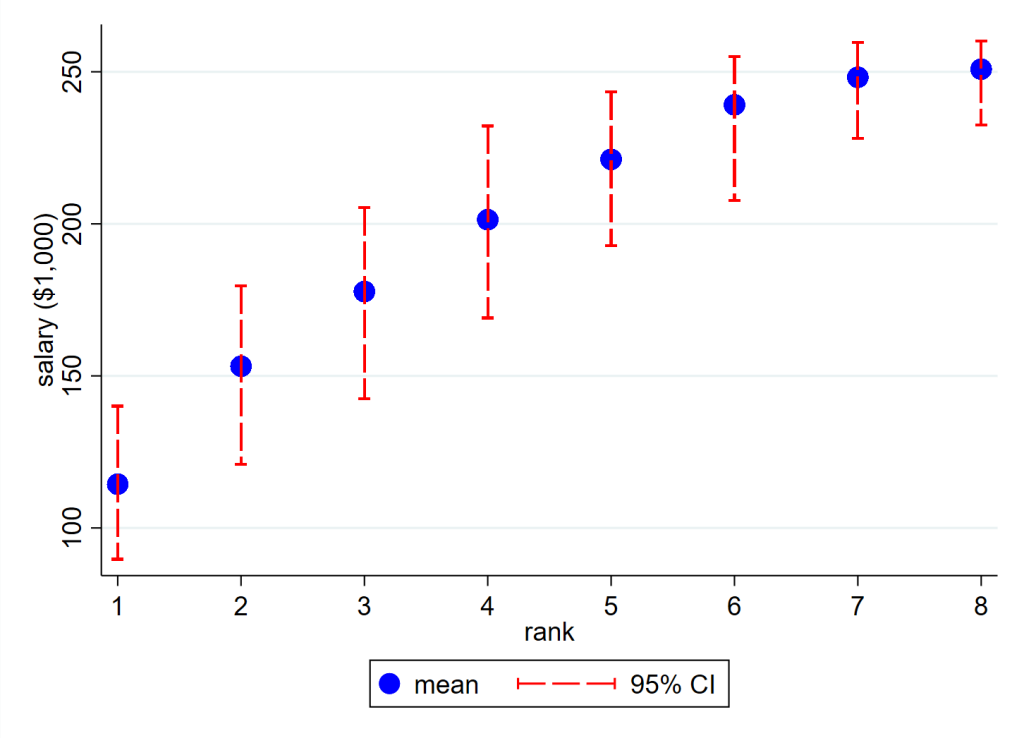
The figure shows the time-series of sample complaints (Panel A), and sample complaints vs. the population of SEC civil complaints (Panel B). The data includes 2,802 complaints.

Figure 3: **Hierarchy Structure at the SEC**



The figure presents the hierarchy structure at the SEC. There are nine grades, ordered from SK-12 (lowest) to SO-3 (highest).

Figure 4: **Compensation Structure**

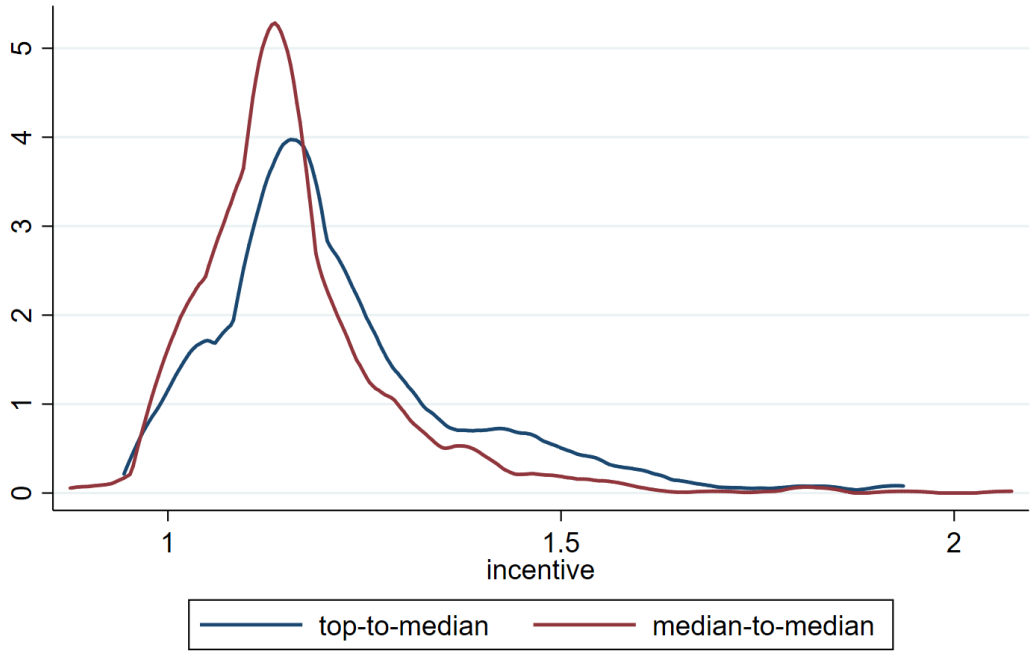


The figure describes the compensation structure at the SEC. For simplicity attorneys in the 9 grades are grouped into 8 hierarchy ranks:

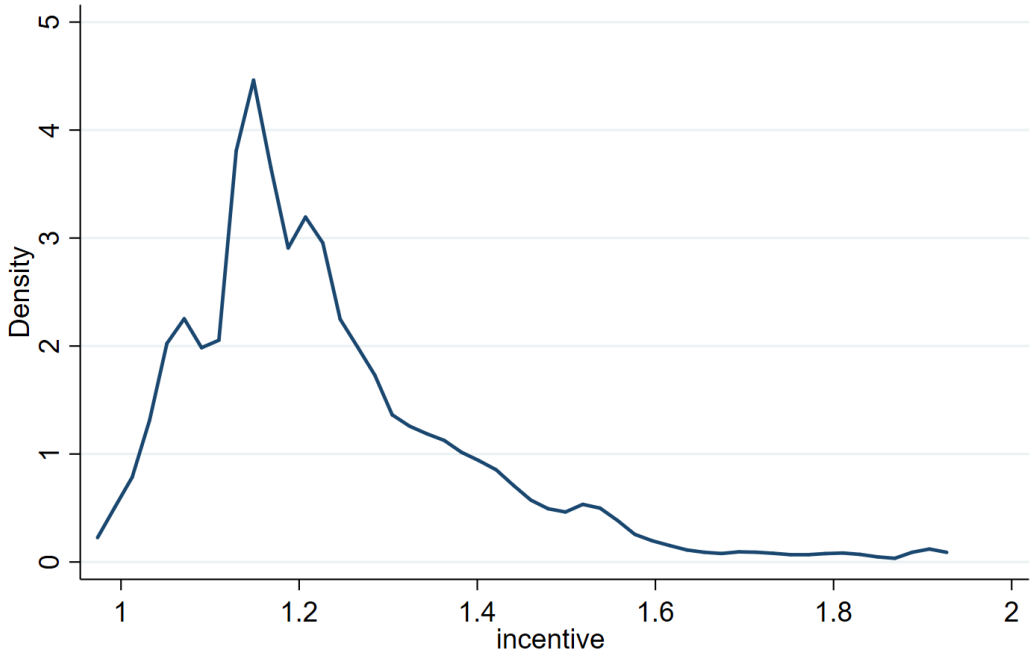
Grade	Rank	Target Grade	Observations
SK-12	1	SK-13	417
SK-13	2	SK-14	1604
SK-14	3	SK-16	7477
SK-16	4	SK-17	2124
SK-15	4	SK-17	984
SK-17	5	SO-01	1697
SO-01	6	SO-02	161
SO-02	7	SO-03	463
SO-03	8	-	13

Figure 5: **Tournament Incentives at the SEC**

A. office-grade sample



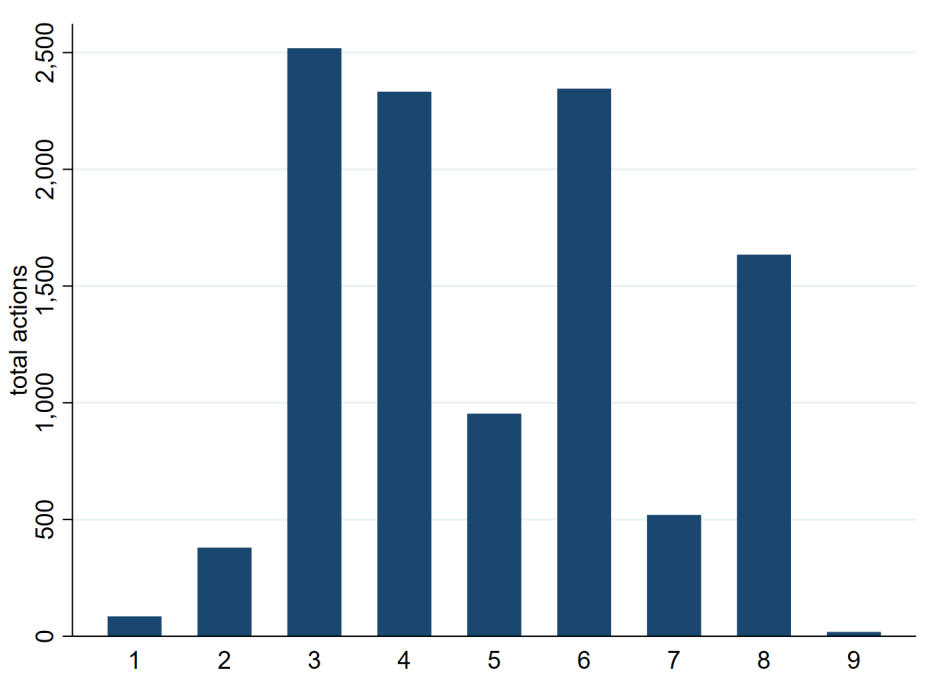
B. Attorney sample



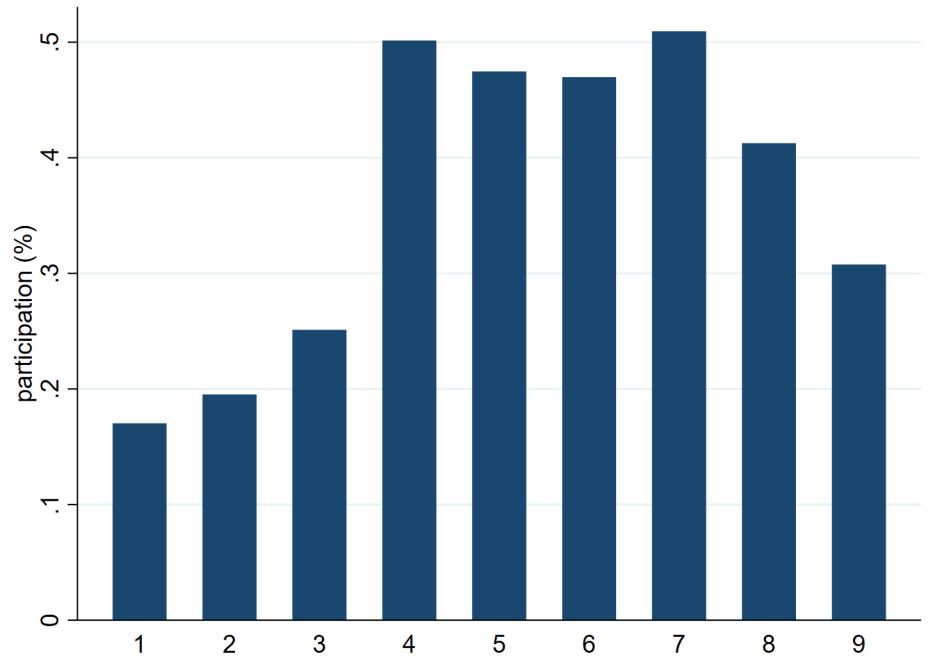
The figure presents the distribution of tournament incentives, over office-grade-year observations (Panel A) and attorney-year observations (Panel B). For variable definitions, see Appendix A.

Figure 6: **Distribution of Enforcement at the SEC**

Panel A. Total Enforcement Activity



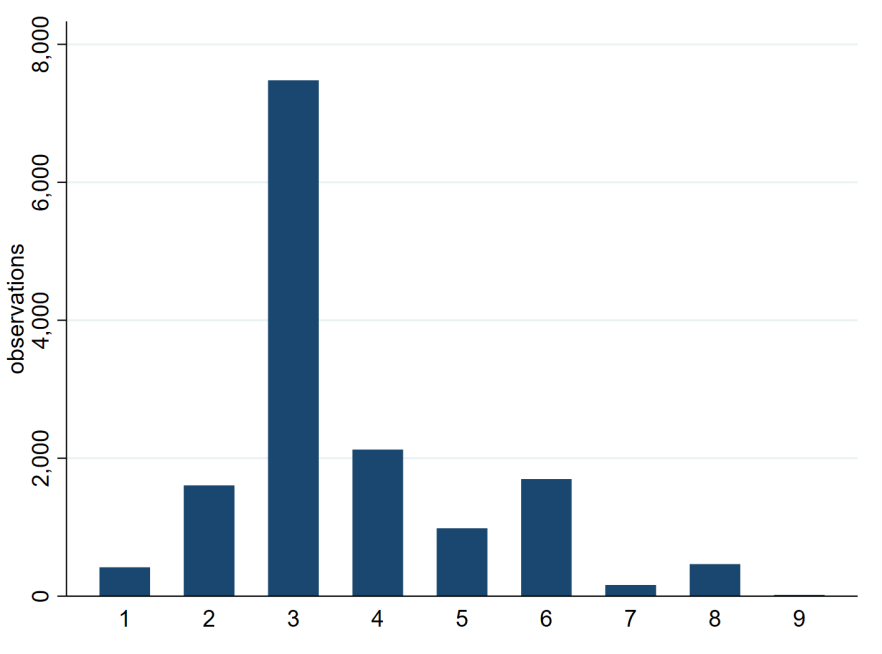
Panel B. Enforcement Participation



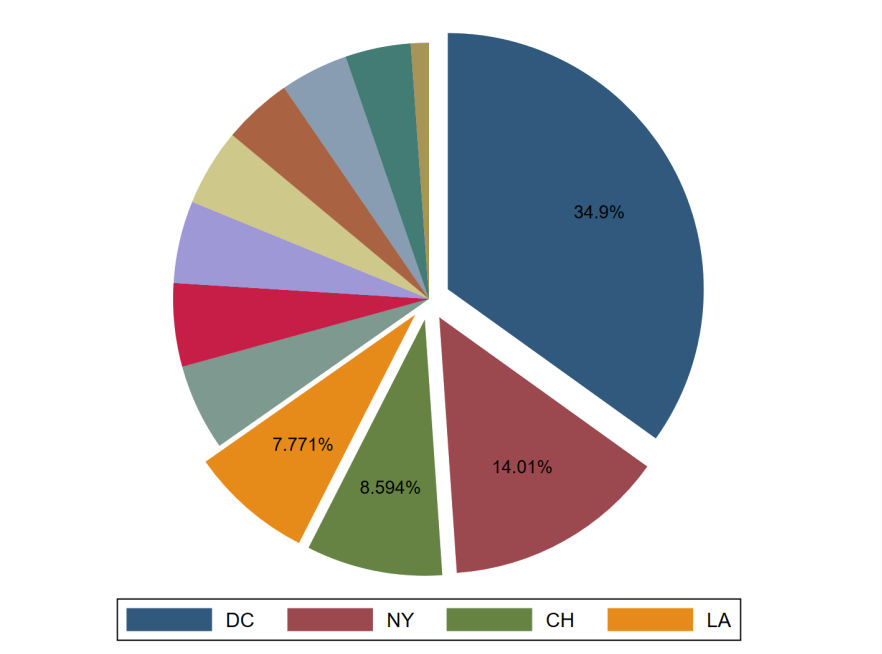
The figure presents the distribution of enforcement over grades. Panel A shows total enforcement activity by grade, and Panel B shows the distribution of $Participation_{o,g,t}$ by grade.

Figure 7: **Distribution of Observations**

Panel A. Pay Grades



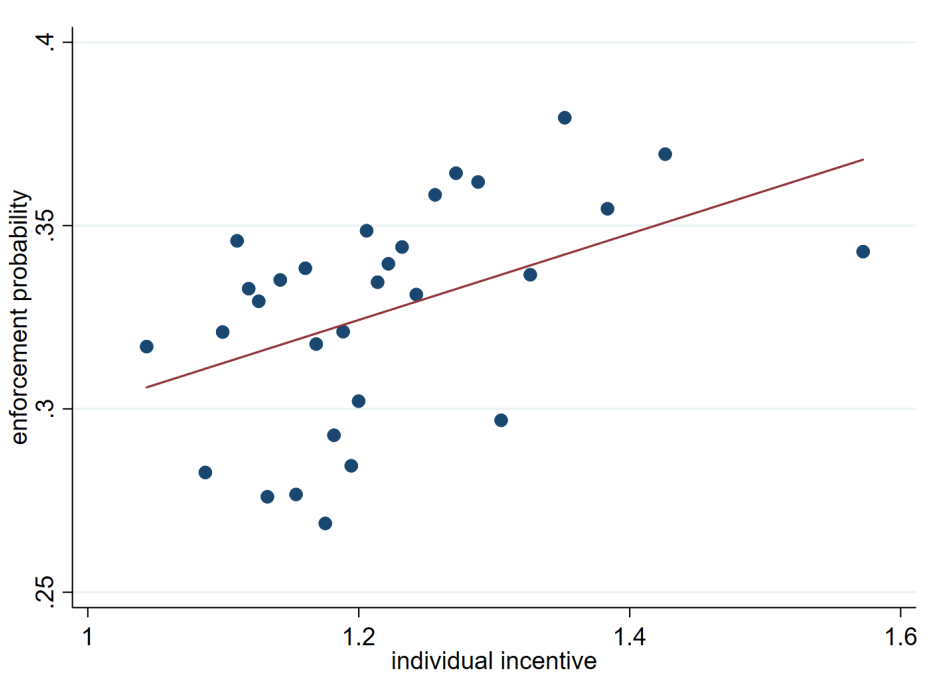
Panel B. Offices



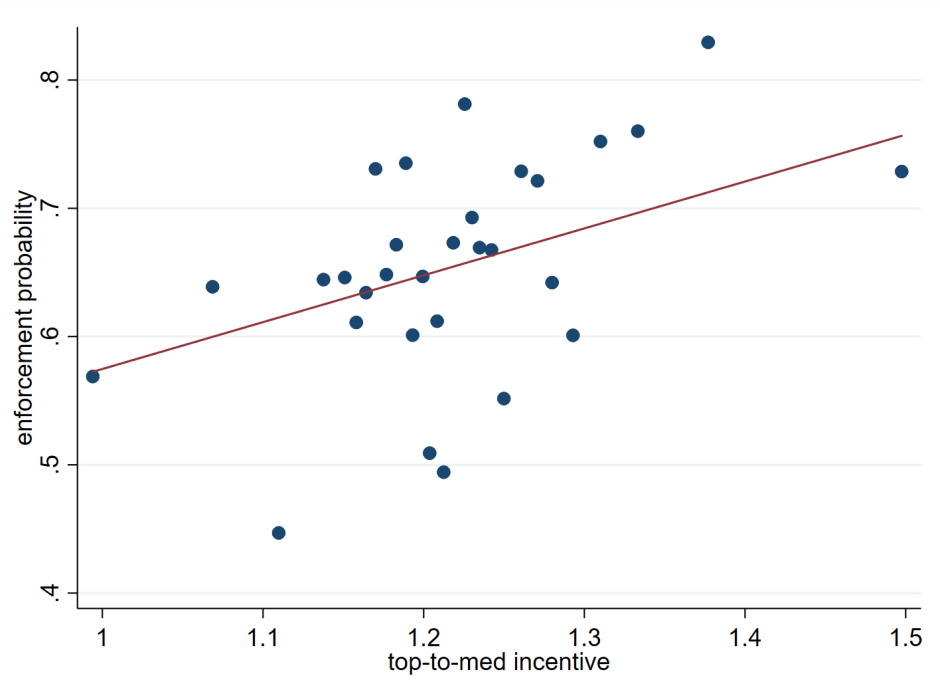
The figure describes the distribution of observations over grades (Panel A) and offices (Panel B). Lowest grade is SK-12, and the highest is SO-3. The SEC's headquarters is in Washington DC (DC), and the regional offices are in New York (NY), Chicago (CH), Los Angeles (LA), Boston, Miami, Denver, Fort Worth, San Francisco, Philadelphia, Atlanta and Salt Lake City.

Figure 8: **Tournament Incentives and Enforcement Activity at the SEC**

Panel A. Attorney Sample



Panel B. Office-Grade Sample



The figure shows the non-parametric relation between enforcement and lagged tournament incentives, controlling for year and grade. In Panel A the outcome is $Dummy_{i,o,g,t}$, which equals one if the attorney participated in any action during the year. In Panel B the outcome is $Dummy_{o,g,t}$, which equals one if the office-grade brought in any action during the year.

Table 1: **Summary Statistics (Attorneys)**

Panel A: **Attorney-year level**

Variable	Mean	Median	Min	Max	Obs
Tenure	9.4	7	1	51	14,940
Salary (2017 USD)	186,107	185,685	48,267	261,164	14,940
Incentive	1.23	1.20	0.99	1.91	12,961
Enforcement (dummy)	32.6%				14,940
Enforcement (total)	0.72	0	0	29	14,940
Enforcement (total, cond.)	2.22	1	1	29	4,867
Promotion	10.1%				14,940
Separation	5.1%				14,940
Office Change	1.0%				14,940

Panel B: **Attorney level**

Variable	Mean	Median	Min	Max	Obs
Enforcerment (dummy)	69.0%				1,915
Enforcement (total)	5.6	2	0	157	1,915
Promotion	54.9%				1,915
Promotions (total)	0.79	1	0	5	1,915
Cohort	2004	2003	1964	2017	1,915
Separation	39.8%				1,915
Office Change	6.9%				1,915
Conditional on > 0:					
Enforcement (total, cond.)	8.2	4	1	157	1,322
Promotions (total, cond.)	1.44	1	1	5	1,052

The table presents summary statistics of all SEC attorneys in the Enforcement Division and regional offices, 2002-2017. For variable definitions see Appendix A. Panel B shows time-invariant statistics.

Table 2: **Summary Statistics (Office-Hierarchy)**

Variable	Mean	Median	Min	Max	Obs
Attorneys	11.7	6	1	207	1,273
Median Salary (2017 USD)	195,675.5	199,668	71,444	261,164	1,273
Regulatory Cap (2017 USD)	203,428.8	208,549	71,444	261,164	1,273
Incentive (top-to-med)	1.22	1.18	0.94	1.94	801
Incentive (med-to-med)	1.16	1.14	0.88	2.07	801
Enforcement (dummy)	65.2%				1,273
Enforcement (participation)	35.9%	30.8%	0.0%	100.0%	1,273
Enforcement (total)	7.2	4	0	76	1,273
Separation (dummy)	31.4%				1,273
Promotion (dummy)	39.7%				1,273
Conditional on > 0:					
Enforcement (participation)	50.9%				830
Enforcement (total)	10.9	8	2	76	830
Separation (share)	5.5%	0.9%	0.0%	100.0%	400

The table presents summary statistics of all office-hierarchy observations. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2017, collapsed to the office-hierarchy level. 2002-2017. For example, all level-1 attorneys in Boston. For variable definitions see Appendix A.

Table 3: **Enforcement and Incentives (office-grade)**

Outcome:	Dummy		Participation		Total	
IncentiveToptoMed	0.319**	0.291*	0.211*	0.281**	0.969**	1.310***
	(0.153)	(0.173)	(0.117)	(0.125)	(0.405)	(0.392)
Attorneys	0.017***	0.017***			0.437***	0.437***
	(0.004)	(0.003)			(0.073)	(0.067)
Tenure	-0.106**	-0.112**	-0.063*	-0.059*	-0.203***	-0.199***
	(0.042)	(0.046)	(0.034)	(0.034)	(0.067)	(0.073)
Office-Grade FE	YES	YES	YES	YES	YES	YES
Year FE	YES	-	YES	-	YES	-
Year-Office FE	-	YES	-	YES	-	YES
R^2	0.589	0.703	0.573	0.700	0.775	0.856
Obs.	698	685	698	685	698	685

The table shows that enforcement and incentives are positively related at the aggregate level. The sample includes all office-grades in the Enforcement Division and regional offices, 2002-2017. *Total* is the log of one plus number of enforcement actions. *Dummy* equals one if the office-grade brought at least one action. *Participation* is the share of attorneys in the office-grade who participated in enforcement actions. *Incentive* is the ratio between the top salary in the next rank to the median salary ("top-to-median" incentive). *Attorneys* is the number of attorneys, and *Tenure* is the median tenure. *Attorneys*, *Tenure* and *Incentive* are in logs, except for columns 1-2. All explanatory variables are lagged. Robust standard errors, clustered by office-grade, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 4: **Enforcement and Incentives (Attorney)**

Outcome:	Dummy			Total		
Incentive	0.117**	0.153***	0.188***	0.404***	0.515***	0.357***
	(0.046)	(0.045)	(0.051)	(0.103)	(0.108)	(0.094)
Year FE	YES	-	-	YES	-	-
Year-Office FE	-	YES	-	-	YES	-
Grade FE	YES	YES	-	YES	YES	-
Year-Office-Grade FE	-	-	YES	-	-	YES
R^2	0.097	0.140	0.195	0.215	0.250	0.374
Obs.	11297	11297	11134	11297	11297	11134

The table shows that incentives predict attorney-level enforcement activity. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2017. *Dummy* equals one if the attorney brought at least one action. *Total* is total numbers of enforcement actions. *Incentive* is the ratio between the top salary in the next rank to the attorney's own salary. All explanatory variables are lagged. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 5: **Tournaments and Case Outcomes**

Outcome:	I(Bar)	Bars	I(Criminal)	Criminal	I(Money)	Money
Incentive	0.045*	0.058**	0.043**	0.042**	0.079**	0.219**
	(0.024)	(0.028)	(0.017)	(0.019)	(0.032)	(0.096)
Year-Office-Grade FE	YES	YES	YES	YES	YES	YES
R^2	0.168	0.231	0.167	0.215	0.195	0.131
Obs.	11134	11134	11134	11134	11134	11134

The table shows that incentives and enforcement outcomes are positively related. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2017. *incentive* is the ratio between the top salary in the next rank to the attorney's salary. $I(Bar)$ equals one if the attorney's enforcement activity resulted in at least one industry bar; $I(Criminal)$ equals one if the enforcement activity was accompanied by a parallel criminal proceeding; and $I(monetary)$ equals one if the enforcement activity resulted in disgorgement or penalty. Bar, $Criminal$, and $Monetary$ are the total bars, total criminal proceedings, and natural log of monetary awards (in 2017 USD), respectively. Explanatory variables are lagged. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 6: **Enforcement, Incentives Alignment, and Tournament (Attorney)**

Outcome:	Dummy			Total		
Incentive	0.163*	0.236**	0.338***	0.501**	0.731***	0.727***
	(0.099)	(0.103)	(0.120)	(0.232)	(0.266)	(0.252)
Bonus	0.025	0.021	0.038**	0.122***	0.098*	0.117***
	(0.017)	(0.018)	(0.019)	(0.044)	(0.050)	(0.043)
Year FE	YES	-	-	YES	-	-
Year-Office FE	-	YES	-	-	YES	-
Grade FE	YES	YES	-	YES	YES	-
Year-Office-Grade FE	-	-	YES	-	-	YES
R^2	0.094	0.139	0.198	0.320	0.346	0.422
Obs.	4125	4125	4047	4125	4125	4047

The table shows that bonus predicts future enforcement activity, alongside tournament incentives. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2009. *Dummy* equals one if the attorney brought at least one action. *Total* is total numbers of enforcement actions. *Incentive* is the ratio between the top salary in the next rank to the attorney's own salary. *Bonus* equals one if the attorney received bonus award. All explanatory variables are lagged. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 7: **Enforcement and Promotions**

Outcome:	Promotion					
EnforcementDummy	0.023***	0.019***	0.018***			
	(0.006)	(0.005)	(0.007)			
EnforcementTotal				0.012***	0.011***	0.011***
				(0.003)	(0.002)	(0.003)
Year-Office-Grade FE	YES	YES	YES	YES	YES	YES
$Tenure(grade)$	YES	-	YES	YES	-	YES
$PastPromotion$	-	YES	YES	-	YES	YES
Employee FE	-	-	YES	-	-	YES
R^2	0.599	0.542	0.729	0.600	0.542	0.729
Obs	8433	12067	8274	8433	12067	8274

The table shows that enforcement has positive relation with promotions. The outcome equals one if the employee was promoted to the next rank during the year. All explanatory variables are lagged: $EnforcementDummy$ equals one if the attorney participated in any enforcement action during the previous year. $EnforcementTotal$ is the number of actions during the previous year. $tenure(grade)$ is the years spent in the current grade. $PastPromotion$ is a dummy indicating whether the attorney was promoted in the previous year. The sample includes all attorneys in the Enforcement Division and regional offices, 2003-2017. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 8: **Enforcement and Bonus**

Outcome:	Bonus					
EnforcementDummy	0.113***	0.064***	0.054**			
	(0.020)	(0.013)	(0.024)			
EnforcementTotal				0.051***	0.028***	0.030***
				(0.008)	(0.005)	(0.011)
Year-Office-Grade FE	YES	YES	YES	YES	YES	YES
$Tenure(grade)$	YES	-	YES	YES	-	YES
$PastBonus$	-	YES	YES	-	YES	YES
Employee FE	-	-	YES	-	-	YES
R^2	0.360	0.346	0.620	0.361	0.346	0.620
Obs	2952	4865	2281	2952	4865	2281

The table shows that enforcement activity has positive relation with bonus awards. The outcome equals one if the employee received a bonus by the end of the year. $EnforcementDummy$ equals one if the attorney participated in any enforcement action during the year. $EnforcementTotal$ is the number of actions during the year. $tenure(grade)$ is the years spent in the current grade. $PastBonus$ is a dummy indicating whether the attorney received a bonus in the previous year. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2009. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 9: **Elasticity of Promotion to Candidates**

Outcome:	Promotions				
Attorneys	0.287***	0.302***	0.645***	0.633***	0.906***
	(0.025)	(0.052)	(0.062)	(0.072)	(0.064)
Tenure		-0.063***	0.008	0.007	0.001
		(0.011)	(0.007)	(0.010)	(0.008)
Office-Grade FE	-	-	YES	YES	YES
Year FE	-	YES	YES	-	-
Year-Office FE	-	-	-	YES	-
Year-Grade FE	-	-	-	-	YES
R^2	0.201	0.364	0.666	0.744	0.793
Obs	506	506	499	468	494

The table shows that the unconditional probability of promotion declines with number of candidates. The outcome is the number of promotions within the year-office-grade, *Attorneys* is the number of attorneys, and $Tenure$ is the mean tenure. All variables are in logs. The sample includes all attorneys in the Enforcement Division and regional offices, 2003-2017, collapsed to the year-office-grade. Robust standard errors, clustered by office-grade, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 10: **Incentives in a Crowded Field (Office-Grade)**

Outcome:	Dummy		Participation		Total	
	Below	Above	Below	Above	Below	Above
Incentive	0.467*	-0.090	0.308*	0.156	1.545**	0.249
	(0.238)	(0.328)	(0.179)	(0.103)	(0.626)	(0.685)
Year FE	YES	YES	YES	YES	YES	YES
Grade-Office FE	YES	YES	YES	YES	YES	YES
R^2	0.567	0.383	0.550	0.660	0.668	0.740
Obs.	318	372	318	372	318	372

The table shows that the incentive effect decreases when the number of candidates increases. I estimate each regression separately for office-grades below and above the median size (6). *Total* is the log of one plus number of enforcement actions. *Dummy* equals one if the office-grade brought at least one action. *Participation* is the share of attorneys in the office-grade who participated in enforcement actions. *Incentive* is the ratio between the top salary in the next rank to the median salary ("top-to-median" incentive). All explanatory variables are lagged. Robust standard errors, clustered by office-grade, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 11: **Incentives in a Crowded Field (Attorney)**

Outcome:	Dummy			Total		
Incentive	0.220***	0.219***	0.220***	0.409***	0.408***	0.415***
	(0.051)	(0.051)	(0.051)	(0.095)	(0.095)	(0.095)
Attorneys·Incentive	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year-Office-Grade FE	-	-	YES	-	-	YES
R^2	0.197	0.196	0.195	0.374	0.374	0.365
Obs.	11134	11134	11020	11134	11134	11020

The table shows that the incentive effect decreases when the number of candidates increases. The sample includes all attorneys in the Enforcement Division and regional offices, 2002-2017. *Dummy* equals one if the attorney brought at least one action. *Total* is total numbers of enforcement actions. *Incentive* is the ratio between the top salary in the next rank to the attorney's own salary. *Attorneys* is the number of attorneys (columns 1, 4); net of departures (columns 2, 5); and net of promotions (columns 3, 6). All explanatory variables are lagged. Robust standard errors, clustered by attorney, are in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 12: **Enforcement, Turnover and Incentives (office-grade)**

Outcome:	Dummy		Participation		Total	
IncentiveToptoMed	0.320**	0.290*	0.211*	0.283**	0.977**	1.306***
	(0.152)	(0.173)	(0.117)	(0.126)	(0.402)	(0.392)
Attorneys	0.017***	0.017***			0.446***	0.442***
	(0.004)	(0.004)			(0.074)	(0.070)
Tenure	-0.106**	-0.112**	-0.063*	-0.059*	-0.200***	-0.198***
	(0.042)	(0.046)	(0.034)	(0.034)	(0.067)	(0.073)
Departures	-0.003	-0.021	0.000	0.017	-0.064	-0.038
	(0.039)	(0.039)	(0.019)	(0.022)	(0.065)	(0.062)
Grade-Office FE	YES	YES	YES	YES	YES	YES
Year FE	YES	-	YES	-	YES	-
Year-Office FE	-	YES	-	YES	-	YES
R^2	0.591	0.705	0.573	0.700	0.776	0.857
Obs.	698	685	698	685	698	685

The table is identical to the baseline specification (Equation 1), except that I add *Departures* as a control. $Departures = 1$ if any attorney left the office-grade.